Lesson 3

Downtown San Diego, California

Population Pressures

Human population has increased in the border region over the past century, and the number of people living in the area has increased at an even faster rate over the past decade. In this lesson, students observe changes in the human population along the U.S.-Mexico border and consider the environmental, economic, and political implications of an increasing human population.

The students use data and maps of the border region to plot population in particular areas along the international border. They then brainstorm the effects of population growth on the natural resources available. Along with population data, the students analyze the infrastructure, income levels, and main industries found in the communities of those specific areas. Finally, students are shown population growth estimates for the border region. Working with the projections helps students understand that population pressures have an important influence on the political relationship between the United States and Mexico.

Learning Objective

Recognize the influence of growing human populations in the United States and Mexico on the relationships between the countries and their decisions about the use and management of natural systems and the goods and ecosystem services they produce.

Background

Mexico's northern border is home to more than 3 million of its 108.5 million citizens (July 2007 estimate). In 1995, one in five U.S. residents lived along the border. This number increased later in the decade, as more people moved to the "Sunbelt" to take advantage of the warm, dry weather, inexpensive housing market (in regions outside of San Diego County), and new job opportunities.

Industrialization in the border region and a stronger economy have encouraged migration to this area. As people come for the industrial jobs, opportunities in the construction, service, and entertainment industries increase, spurring even more migration. Both the United States and Mexico are keeping a careful eye on the growth and development needs of residents in the border region.

The population density in the region is already placing a severe strain on natural resources. The migrants use more land, water, and energy from the area and contribute more waste to the environment. Border cities with infrastructure built for 1990 are finding it hard to keep up with the current demand for roads, land, potable water, sewage systems, and recreational areas. Upgrading to meet the demand costs money.

The U.S. and Mexican governments allocate monies for infrastructure differently. The different income and tax structures in the two nations account for some of the difference. Wages in Mexico's border cities are much lower than in border cities on the U.S. side. The cost of living on the Mexican side is also much lower, but the cost their government pays for infrastructure is essentially the same as in the United States. Residents of Mexico's poverty-stricken *colonias* do not generally have access to potable water or sewage systems, and the lack of infrastructure increases their risk of health-related problems, putting a further strain on the country's financial resources. Experts anticipate that the population in Mexico's *colonias* will grow to 20 million by 2020, but the high level of poverty is likely to continue.

Wastewater flowing in Los Laureles Canyon

Key Vocabulary

Median household income: A statistical value that divides household income into two segments: one half the population earning less than the median household income and the other half earning more.

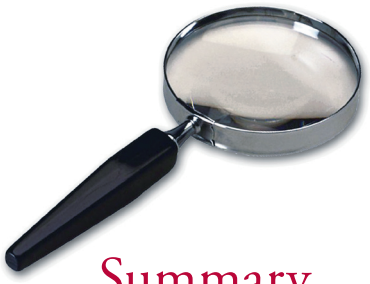
Municipal: Relating to a town, city, or region that governs itself.

Population density: The measurement of population per unit area. Human population density is typically measured in units of people per square miles or kilometers.

Tear: To shred apart.

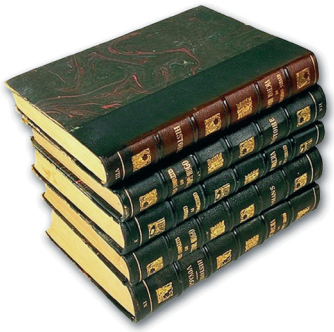
Poverty rate: An estimated percentage of people lacking the income (money) necessary to meet their basic needs for health (food, shelter, clothing, and medical care).

Toolbox



Summary of Activities

Students add population data to a map of the border region, analyze the infrastructure and economic opportunities in specific border cities, and consider the effects of population growth on the environmental problems discussed in previous lessons.



Instructional Support

See Extensions & Unit Resources, page 32

Prerequisite Knowledge

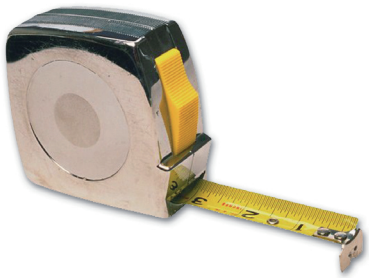
Students should know about:

- basic population dynamics.

Students should be able to:

- read and interpret maps.
- read and interpret statistical data and percentages.

Advanced Preparation



Gather and prepare Activity Masters:

- Gather from previous lessons:
  - **Border Region Map** from Lesson 2

Gather and prepare Materials Needed.

Gather and prepare Visual Aids:

- Prepare transparencies.
- Gather from previous lessons:
  - **Border Region Map** Visual Aid #3 from Lesson 1

Materials Needed

A-V equipment:
- Overhead or LCD projector, screen

Class supplies:
- Pencils

Visual Aids

Transparencies:
- **Population Data for Six Border Cities**, Visual Aid #2
- **Population Graph**, Visual Aid #3

Duration

Preparation Time
20 min.

Instructional Time
55 min.

Safety Notes

None

Activity Masters in the Supporting Materials (SM)

Community Statistics
SM, Page 24–25
One per student

Procedures

Vocabulary Development

As appropriate, in each lesson introduce new vocabulary words using the **Key Unit Vocabulary** (Lesson 1 Activity Master).

Step 1

Return students' individual copies of the **Border Region Map** (Lesson 2 Activity Master) and display the transparency of the **Border Region Map** (Visual Aid #1). Direct the class to locate the cities shown on the map in both the United States and Mexico. Ask students which of these cities they think has the largest population. (*Answers will vary.*) Then ask, "What might be the relationship between the population in those cities and the environmental issues we learned about in the last lesson?" (*People need resources to live. Those resources are water, land, air, food, and space. The more people there are in an area, the more resources they need; these needs raise issues. Also, how people handle the resources, like recycle waste or pollute them, may or may not cause problems.*)

Tell students that, during this lesson, they will compare population data and other community information about some border cities. Their goal is to look for patterns and relationships in the data.

Step 2

Display the **Population Data for Six Border Cities** (Visual Aid #2). Define "population density" for students: the number of persons per unit area, typically indicated as the number of people per square mile or square kilometer. Ask students, "Which city has the highest population density?" (*Tijuana has the greatest population density.*) Then ask, "Which of these cities has the largest overall population?" (*San Diego*) You may need to explain that to find the overall population of each city, students must multiply the population density by the city area.

Have the students rank the cities from 1 to 6 in terms of their overall population, with 1 being the city with the largest population and 6 being the city with the smallest population. (*#1 San Diego, #2 Tijuana, #3 Nogales, #4 El Paso, #5 Yuma, #6 Presidio*) Direct students to write those rankings on their **Border Region Map** next to the names of the cities. Ask students if they see any relationships between the populations of the cities and their locations on the map. (*Answers will vary but may include proximity to international highways, to water [rivers and the Pacific Ocean], to other points of interest such as national parks.*)

Step 3

Pair students and distribute a copy of **Community Statistics** (Lesson 3 Activity Master) to each student. Explain that this handout provides additional information about the population in the six communities. Have students first look at the data set for San Diego, California. Remind students to use their copy of the **Key Unit Vocabulary** if they need it.

Direct students to work with their partners to interpret information on their **Border Region Map,** the population data on the transparency, and the information on **Community Statistics.** They should try to identify patterns or relationships in the data. Tell students to write descriptions of at least three patterns or relationships on their copy of **Community Statistics.** Give students 10 minutes to complete this work.

Using the information for San Diego as an example, ask students if they see any pattern when they compare San Diego to the other border cities. (*San Diego has the lowest poverty rate and the greatest access to municipal water.* Other examples are provided as answers to the questions in Step 4.)

Step 4

When time is up, have each student pair share one of the patterns or relationships they identified. (Answers will vary.) Write the patterns and relationships on the board. Assist the class with identifying others:

- *The city without agriculture as a main industry has the lowest median household income (Tijuana).*
- *The city that has the highest population density has little to no agriculture as industry (Tijuana).*
- *The city with the highest poverty rate does not have manufacturing as a main industry (Presidio).*
- *The city with the lowest population seems to have the most natural land and water resources (Presidio).*
- *The cities in Mexico (Tijuana and Nogales) have fewer households with access to municipal water and sewer than the cities in the United States.*
- *In cities with the highest poverty rates, agriculture is the second main industry (Presidio and Nogales).*
- *San Diego is the only city where more people have access to municipal water than municipal sewer systems.*

Step 5

Place the **Population Graph** (Visual Aid #3) on the overhead or LCD projector. Point out the features of the graph and the general estimation of population growth in the border region.

Ask the students to speculate on the implications of population growth like that shown in the graph. Use the following discussion questions to prompt student thought:

- Where do you think the new populations will most likely settle and why? (*In the area of the border region already settled—that is, the cities. The infrastructure, job opportunities, and fact that family and friends may already be settled in these areas will be among the reasons.*)
- Taking into consideration the climate, physical geography, and population density, which city do you predict will have the most environmental problems as the population continues to grow? Why? (*Possible answer: Tijuana will have the most environmental problems because of the high population density and the fact that it does not have enough infrastructure and the median household income is so low.*)
- What makes one city better than another at dealing with environmental issues? (C*ities with the financial means to deal with environmental issues are better equipped to do so. They may plan or possibly limit housing for the people settling in the area, and prevent development that might damage the land. They are better able to build the infrastructure needed for the number of people to live in the area, thereby preventing pollution. They also have more money and resources to enforce the rules that require industries to be more responsible in their practices.*)
- How might the issue of population growth affect the relationship between Mexico and the United States? (*The population in the border region influences the environment, thus affecting the natural resources and people of both countries. To solve current problems and prevent other problems from arising in the future, the countries need to work together.*)

Step 6

Have the students complete the questions on the back of **Community Statistics**. If additional time is needed, have them complete the questions as homework.

When students have completed their work, collect the completed worksheets and **Border Region Maps** from students. Use the completed **Community Statistics** worksheets in assessment.

Lesson Assessment

Description

This lesson helps students recognize that population growth in the border region influences the natural systems and resources in the area. Student responses to the questions on **Community Statistics** (Lesson 3 Activity Master) demonstrate their understanding of the influence of population growth on natural and human social systems in the region, and on the relationship between the United States and Mexico.

Suggested Scoring

Use the Answer Key and Sample Answers provided on pages 69-70 to assess student work. Each question on **Community Statistics** is worth five points for a total of 20 points.

Answer Key and Sample Answers

Community Statistics

Lesson 3 Activity Master | *page 1 of 2*

Name: _____

San Diego, California, United States

- Access to municipal water: 99% of households
- Access to municipal municipal sewage: 98% of households
- Poverty rate is: 12.4%.
- Median household income is: $45,733.
- Main industries are: manufacturing, shipping, tourism, and agriculture.

Tijuana, Baja California, Mexico

- Access to municipal water: 80% of households
- Access to municipal municipal sewage: 85% of households
- Poverty rate is: 18.4%.
- Median household income is: $9,812.
- Main industries are: manufacturing, service, and tourism.

Yuma, Arizona, United States

- Access to municipal water: 98% of households
- Access to municipal municipal sewage: 98% of households
- Poverty rate is: 14%.
- Median household income is: $35,374.
- Main industries are: manufacturing, service, and agriculture.

Nogales, Sonora, Mexico

- Access to municipal water: 83% of households
- Access to municipal municipal sewage: 88% of households
- Poverty rate is: 33.9%.
- Median household income is: $22,306.
- Main industries are: manufacturing, agriculture, and tourism.

Presidio, Texas, United States

- Access to municipal water: 93% of households
- Access to municipal municipal sewage: 94% of households
- Poverty rate is: 43%
- Median household income is: $18,031.
- Main industries are: service and agriculture.

El Paso, Texas, United States

- Access to municipal water: 98% of households
- Access to municipal municipal sewage: 99% of households
- Poverty rate is: 20%.
- Median household income is: $32,124.
- Main industries are: manufacturing, agriculture, and service.

Patterns/ Relationships in the Data:

1. The city with the highest poverty rate does not have manufacturing as a main industry (Presidio).

2. San Diego is the only city where more people have access to municipal water than municipal sewer systems.

3. The city without agriculture as a main industry has the lowest median household income (Tijuana).

Community Statistics

Lesson 3 Activity Master | *page 2 of 2*

Name: _____

Questions to Consider: (5 points each)

1. What is the effect of population growth in areas where water, air, and land are already issues?

Growing populations require more resources. As the population grows, problems are likely to get worse, especially in areas where there are already problems related to water quantity and quality, air quality, and land resources.

2. How does the infrastructure in U.S. border cities differ from that in Mexican border cities? How might this affect the environment?

The Mexican border cities have less infrastructure than the U.S. border cities. This means that there is not enough water for the people living there and that sewage is going untreated, which will pollute the land and water supplies.

3. Why should the United States care about the infrastructure and population growth in Mexico's border cities?

The two countries share the same land, water, and air. Pollution and health problems in the area affect both countries' resources and populations.

4. Based on the information in this lesson, what two questions would you like to ask members of the U.S. or Mexican governments? Write your questions here:

Why doesn't the Mexican government allocate more money to improving the infrastructure in border communities?

How can the poverty rate in Presidio be 43% while such a high percentage of households have domestic access to water and sewer?

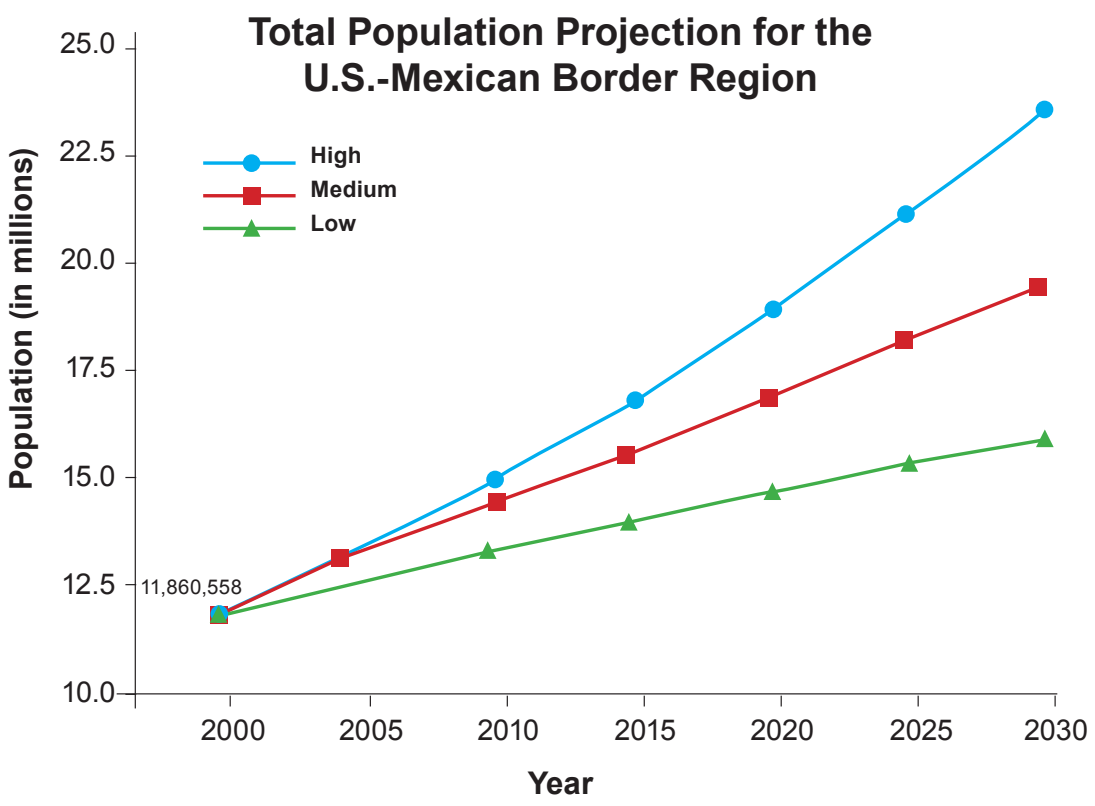
2 **Population Data for Six Border Cities**
Visual Aid — Transparency

Population Data for Six Border Cities

City	Area, square miles (square kilometers)	Population Density, people per square mile (people per square kilometer)
San Diego	372 (964)	3,871 (1,494)
Tijuana	246 (637)	5,727 (2,212)
Yuma	107 (276)	725 (281)
Nogales	647 (1,675)	1,002 (387)
Presidio	2.7 (7)	1,623 (626)
El Paso	251 (649)	2,260 (874)

3 **Population Graph**
Visual Aid — Transparency

Population Graph



J. Peach and J. Williams. 2003. "Population Dynamics of the U.S.-Mexico Border Region." Unpublished, forthcoming SCERP Monograph. San Diego: SCERP/SDSU Press.